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भाग 3 मानव-निर्मित रेशे

( पहला पुनरीक्षण )

**Textile Dyestuffs — Identification of  
the Application Classes of Dyes on  
Textile Materials**

**Part 3 Man-Made Fibres**

( *First Revision* )

ICS 59.040

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## FOREWORD

This Indian Standard (Part 3) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Textile Speciality Chemicals and Dyestuffs Sectional Committee had been approved by the Textiles Division Council.

This standard was first published in 1973 and the present revision has been taken up to update the method taking into consideration the technological developments since the publication.

This Indian Standard is published in three parts. The other parts in this series are:

Part 1 Cotton and other cellulosic fibres

Part 2 Wool, silk and other protein fibres

Part 3 Man-made fibres

The composition of the Committee responsible for the formulation of this standard is given at Annex B.

In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

*Indian Standard*

# TEXTILE DYESTUFFS — IDENTIFICATION OF THE APPLICATION CLASSES OF DYES ON TEXTILE MATERIALS

## PART 3 MAN-MADE FIBRES

( *First Revision* )

### 1 SCOPE

**1.1** This standard (Part 3) prescribes methods for identification of application classes of dyes on man-made fibres, such as secondary acetate, triacetate, acrylic, polyester, polyamide, polyvinyl alcohol, polyvinyl chloride, polyvinyl acetate, polyurethane and polyolefin fibres; their blends with each other and with natural and regenerated-cellulosic fibres.

**1.1.1** The standard is not applicable to protein fibres or blends thereof.

**1.2** The methods are applicable to types of dyes normally used for dyeing and printing on man-made fibres.

### 2 REFERENCES

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

<i>IS No.</i>	<i>Title</i>
323 : 2009	Rectified spirit for industrial use — Specification ( <i>second revision</i> )
336 : 1973	Specification for ether ( <i>second revision</i> )
1070 : 1992	Reagent grade water — Specification ( <i>third revision</i> )
1919 : 1982	Specification for sodium hydrosulphite ( <i>first revision</i> )

### 3 PREPARATION OF TEST SPECIMEN

**3.1** If the sample under test is fibre or yarn, take a tuft of fibre or yarn of about 3 cm in length.

**3.2** If the sample under test is fabric, take a 3 × 3 cm test piece.

#### NOTES

**1** In case of multi-coloured woven fabrics, the different coloured yarn should be identified separately.

**2** In case of printed fabrics the sample should be taken from the printed portion of the sample.

**3.3** In the case of finished textiles, the sample should be treated twice with 1 percent hydrochloric acid at boil for 5 min.

**3.4** Any finish present in the sample shall be removed prior to identification of application classes of dyes by the procedure given in **3.4.1** to **3.4.6**. If the extract is appreciably coloured at any stage it should be analysed individually for the application classes of dyes as given in Annex A.

NOTE — These procedures are given only as guide and it must be stressed that a number of finishes are likely to be encountered which will not be removed by these treatments and for which certain other treatments may be necessary.

**3.4.1** Treat the specimen with 1 g/l of a non-ionic detergent at 60 to 70 °C for 15 to 20 minutes. Wash well first with warm water and then with cold water and dry.

**3.4.2** Boil the specimen obtained in **3.4.1** with 50 ml of carbon tetrachloride under reflux for 5 minutes.

**3.4.3** Boil the specimen obtained in **3.4.2** with 50 ml of ethyl alcohol, under reflux, for 5 min.

**3.4.4** Boil the specimen obtained in **3.4.3** with 50 ml of distilled water, under reflux, for 5 min.

**3.4.5** Boil the specimen obtained in **3.4.4** with dioxane, under reflux, for 5 min.

**3.4.6** Boil the specimen obtained in **3.4.5** with 50 ml of distilled water containing 2 ml of concentrated hydrochloric acid, under reflux, for 5 min.

## 4 APPARATUS, MATERIALS AND REAGENTS

### 4.1 Apparatus

**4.1.1** *Microscope*

**4.1.2** *Test Tubes*

**4.1.3** *Separating Funnels*

**4.1.4** *Porcelain Crucible*

### 4.2 Materials

**4.2.1** *Lead Acetate Paper*

**4.2.2** *Mordanted Wool*

**4.2.3** *Scoured Acetate Fabric*

**4.2.4** *Scoured Cotton*

**4.2.5** *Scoured Wool*

**4.2.6** *Magnesium Ribbon*

**4.2.7** *Zinc Dust, Pure*

### 4.3 Reagents

**4.3.0** *Quality of Reagents* — Unless specified otherwise, pure chemicals shall be employed in tests and distilled water (see IS 1070 : 1992) shall be used where the use of water as reagent is intended.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the test results.

**4.3.1** *Acetic Acid* — (a) 5 percent (m/v), and (b) 30 percent (m/v).

**4.3.2** *Ammonia Solution* — (a) 1 percent (v/v), and (b) concentrated (sp gr 0.88).

**4.3.3** *Carbazol* — 0.1 percent.

**4.3.4** *Chromotropic Acid Solution* — 5 percent (aqueous).

**4.3.5** *Ether* (see IS 336 : 1973).

**4.3.6** *Ethylene Diamine Hydrate* — sp gr 0.960.

**4.3.7** *Ethylene Diamine Tetra-acetic Acid Disodium Salt*

**4.3.8** *Formic Acid* — 85 percent.

**4.3.9** *Formosul G*

**4.3.10** *Glycerol*

**4.3.11** *Hydrochloric Acid* — (a) 16 percent (v/v), and (b) concentrated (sp gr 1.18).

**4.3.12** *Hydrogen Peroxide* — 30 percent (m/v) (100 volumes).

**4.3.13** *Nitric Acid* — Concentrated.

**4.3.14** *Non-ionic Detergent*

**4.3.15** *O-Chlorophenol*

**4.3.16** *Paraffin, Liquid*

**4.3.17** *Pyridine*

**4.3.18** *Sodium Carbonate*

**4.3.19** *Sodium Hydroxide Solution* — (a) 5 percent, and (b) 20 percent.

**4.3.20** *Sodium Hydrosulphite* — (a) 0.2 percent (m/v) solution and (b) solid (see IS 1919 : 1982).

**4.3.21** *Sodium Hypochlorite Solution* — Containing 2 g/l of available chlorine.

**4.3.22** *Sodium Nitrate*

**4.3.23** *Sodium Sulphate Solution* — 0.2 percent (m/v).

**4.3.24** *Solution of Dispersing Agent* — 10 percent (w/v).

**4.3.25** *Sulphuric Acid* — (a) 5 percent (v/v), and (b) concentrated.

**4.3.26** *Tannic Acid*

**4.3.27** *Toluene*

## 5 PROCEDURE

**5.1 Microscopic Examination** — Examine the test specimen under the microscope. If the dye is found to be present on the surface of the fibre as particles, it indicates pigment colorants, namely, carbon black, vat, azoic or phthalocyanine [see 3 (b) under Additional Tests in Annex A].

**5.2** For identification of application classes of dyes, follow the procedure as given in Annex A.

### NOTES

**1** While identifying the dyes used for dyeing pale shades, it is advisable to use large specimens and large quantities of reagents and concentrate the extract before making the tests.

**2** Before identification the fibres in the blend may be separated, by a suitable method, if necessary.



**ADDITIONAL TESTS**

- 1) *Extraction Test* — Extract 0.5 g of fresh test specimen with 15 ml of 57:43 pyridine-water in a test tube by keeping it in a beaker of boiling water for 10 to 15 minutes, or until sufficient amount of colour bleeds into the reagent. Discard the test specimen and note the colour of the extract. Pour the solution into a separating funnel, add 15 ml of toluene, shake well and allow the two layers to separate. The distribution of dyes between the two layers is as follows:

<i>Toluene Layer</i>	<i>Pyridine-Water Layer</i>
All disperse dyes	All direct dyes
Some neutral dyeing metallized dyes	All basic dyes
(1 : 2 metal complex dyes)	All acid dyes
Some vat dyes	All acid dyeing metallized dyes
Some reactive disperse dyes	(1 : 1 metal complex dyes)
All azoic combinations	All chrome dyes
	Logwood :
	Some neutral dyeing metallized dyes
	(1 : 2 metal complex dyes)

If the toluene layer is coloured, wash it with water thrice. Separate the toluene layer again and evaporate it. Disperse the residue with a few drops of 10 percent solution of a dispersing agent in water. Add scoured wool and scoured acetate fabric to this and warm for 15 minutes.

If only wool is dyed, it indicates NEUTRAL DYEING METALLIZED DYE (that is, 1 : 2 METAL COMPLEX DYE).

If both wool and acetate fabric are dyed, it indicates DISPERSE DYE.

If the pyridine-water layer is coloured dark cherry-red, it indicates *Logwood*. Add 1 to 2 ml of concentrated hydrochloric acid, it turns yellowish brown; shake with toluene, the colour remains in pyridine-water layer.

NOTE — In case of chrome dyes pyridine-water layer is coloured. But sometimes the toluene layer is also stained to a different colouration than original dyeing.

- 2) *Ash Test* — Ash 0.2 to 0.3 g of fresh test specimen in a porcelain crucible. Add 0.2 to 0.3 g of flux composed of equal parts by weight of powdered sodium carbonate and sodium nitrate. Fuse the mixture and allow it to cool. The presence of any metals is indicated by the colour of the fused mass as follows:

<i>Colour of Fused Mass</i>	<i>Metal Present</i>
Yellow colour	Chromium
Royal blue	Cobalt
Faint blue-green	Copper
Blue-green	Manganese
Brown	Nickel

The presence of cobalt or manganese indicates NEUTRAL DYEING (1 : 2 METAL COMPLEX DYES).

The presence of chromium indicates DIRECT DYE after-treated with chromium salt, chrome dyes or metallized dyes (that is, 1 : 1 metal complex dye and 1 : 2 metal complex dye).

The presence of copper or nickel indicates DIRECT DYE after-treated with copper or nickel salt respectively.

3) *Miscellaneous Tests*

- a) *Test for Reactive Disperse Dye on Nylon 6 and 66* — Dissolve 0.5 g of fresh test specimen in formic acid or o-chlorophenol and pour the resulting solution into 1 ml of ethylene diamine hydrate diluted with 5 to 10 ml of water. Warm for 5 to 10 min and then filter. If the dye remains along with the precipitate, it is a REACTIVE DISPERSE DYE.

- b) *Test for Pigment Colourant* — If pigment colourant is found to be present by the microscopic examination (see 5.1) and azoic and vat pigments are found to be absent by the relevant subsequent tests, the pigment colourant present may be carbon black or phthalocyanine pigment.

Treat a test specimen with sodium hydroxide and sodium hydrosulphite solution, no discolouration of the specimen indicates CARBON BLACK.

Spot a test specimen with concentrated nitric acid, appearance of bright-green tone indicates PHTHALOCYANINE PIGMENT.

**ANNEX B***( Foreword )***COMMITTEE COMPOSITION**

Textile Speciality Chemicals and Dyestuffs Sectional Committee, TXD 07

<i>Organization</i>	<i>Representative(s)</i>
Department for Jute and Fibre Technology, Institute of Jute Technology, University of Calcutta	PROF A. K. SAMANTA ( <b><i>Chairman</i></b> )
Ahmedabad Textile Industry's Research Association, Ahmedabad	SHRIMATI DEEPALI PLAWAT SHRI FAHIMUUNISA KHATIB ( <i>Alternate</i> )
Ama Herbals, Lucknow	SHRI Y. A. SHAH
Atul Ltd (Colors Division), Atul	SHRI V. R. SAI GANESH SHRI ARINDAM CHAKRABORTY ( <i>Alternate</i> )
Central Institute for Research on Cotton Technology, Mumbai	DR (SHRIMATI) SUJATA SAXENA DR A. S. M. RAJA ( <i>Alternate</i> )
Archroma India Pvt Limited, Mumbai	SHRI RAJESH RAMAMURTHY SHRI ASHIM GHOSH ( <i>Alternate</i> )
BioDye India Pvt Ltd, Sawantwadi, Maharashtra	DR BOSCO HENRIQUES
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Global Organic Textile Standard, (GOTS)	MS PRACHI GUPTA SHRI RAHUL BHAIKAR ( <i>Alternate</i> )
Indian Institute of Technology, Kanpur	PROF RAJ GANESH S. PALA
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Northern India Textile Research Association, Ghaziabad	DR M. S. PARMAR
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Shree Pushkar Chemicals and Fertilizers Ltd, Mumbai	DR N. N. MAHAPATRA
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Textiles Committee, Mumbai	SHRI KARTIKEYA DHANDA SHRIMATI SHILPI CHAUHAN ( <i>Alternate</i> )
The Arvind Mills Limited, Ahmedabad	SHRI RAJARSHI GHOSH SHRI UMASANKAR MAHAPATRA ( <i>Alternate</i> )
The Bombay Textile Research Association, Mumbai	DR (SHRIMATI) PADMA S. VANKAR SHRI M. P. SATHIANARAYANAN ( <i>Alternate</i> )
The South India Textile Research Association, Coimbatore	DR PRAKASH VASUDEVAN SHRI S. SIVAKUMAR ( <i>Alternate</i> )

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UP Textile Technology Institute, Kanpur	PROF (SHRIMATI) ABHA BHARGAVA DR ARUN PATRA ( <i>Alternate</i> )
Universal Starch Chem Allied Limited, Dhule	SHRI D. A. PATIL
Wool Research Association, Thane	SHRIMATI SMITA BAIT SHRIMATI (DR) MRINAL CHOUDHARY ( <i>Alternate</i> )
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SCIENTIST 'F' AND HEAD (TXD), BIS





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